



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/518,934

12/22/2004

Kazuyuki Tohji

Q85487

1299

65565

7590

02/19/2008

SUGHRUE-265550

2100 PENNSYLVANIA AVE. NW

WASHINGTON, DC 20037-3213

EXAMINER

HAILEY, PATRICIA L

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

02/19/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,934	<b>Applicant(s)</b> TOHJI ET AL.	
	<b>Examiner</b> PATRICIA L. HAILEY	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-14 and 18-23 is/are rejected.
- 7) ☒ Claim(s) 9 and 15-17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on December 3, 2007, has been entered.

Applicants' submission includes an amendment, in which claim 12 was amended. No other claims were canceled or added.

Claims 1-23 remain pending in this application.

***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicants' Priority Document was filed on December 22, 2004.

***Double Patenting***

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

Art Unit: 1793

F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**4. *Claims 1 and 3-5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/507,895.***

Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are directed to photocatalysts comprising a capsule structure comprising a cadmium compound shell and a void, and further characterized by supporting platinum thereon.

The combination of claims 1 and 3-5 in the instant application reads upon that of claim 1 in the copending '895 application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**8. *Claims 1-3, 6-8, 10-14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai et al. (U. S. Patent No. 6,051,614).***

Hirai et al. disclose a method for preparing a non-aqueous dispersion of metallic particles and/or metal compound particles, said particles being advantageously used for producing catalytic materials (col. 2, lines 50-56, of Hirai et al.; considered to read upon “photocatalyst”).

The method involves obtaining aqueous dispersions of metal particles such as metal sulfides (e.g., sulfides of metals such as cadmium) by a conventional method in which an aqueous solution of a metal salt is treated with, for example, a sulfide-forming agent. For example, cadmium sulfide can be obtained by treating an aqueous solution of a metal salt with agents such as sodium sulfide. See col. 4, line 66 to col. 5, line 35 of Hirai et al. (considered to read upon **claims 8, 10, 12, and 18**).

Examples of the metal compound particles of the aqueous dispersion to be used in Patentees’ invention include particles of metal hydroxides and oxides, e.g., those of metals such as cadmium. See col. 4, line 66 to col. 5, line 5 of Hirai et al. (considered to read upon **claims 13 and 14**).

Exemplary metal salts to be employed in Patentees’ invention include halides, and nitrates. See col. 6, lines 6-10 of Hirai et al. (considered to read upon **claim 11**).

The particle size of the thus-obtained metal compound particles in the aqueous dispersion ranges from 1 nm to 3  $\mu$ m (3000 nm; considered to read upon **claim 2**). See col. 5, lines 39-41 of Hirai et al.

Hirai et al. do not disclose that the particles exhibit a “cadmium compound shell and a void”, or having pores “extending from its surface to its interior” (**claims 1, 6, and 7**).

However, because the reference teaches methods for producing particles comparable to that instantly claimed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to reasonably expect that the particles produced by the processes disclosed in Hirai et al. would exhibit a shell and a void, absent the showing of convincing evidence to the contrary.

**9. *Claims 1-8, 12, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buhler et al. (U. S. Patent No. 4,484,992).***

Buhler et al. disclose a catalyst comprising a cadmium sulfide/semiconductor powder, which is at least partially coated with a noble metal. See col. 2, lines 28-33 of Buhler et al.

Examples of the noble metal include platinum. See col. 3, lines 36-39 of Buhler et al.

The noble metal particles on the semiconductor powder preferably have a particle size ranging from 10 angstroms to 1000 angstroms (1 to 100 nm). See col. 3, lines 62 and 63 of Buhler et al.

Because Buhler et al. is considered to read upon **claims 1-5** in their present form, the claim limitations recited in **claims 6 and 7** (regarding the presence of pores) are considered encompassed by Buhler et al.

The catalyst can be prepared via any of a number of methods, such as by photocatalytic deposition of the metals on the semiconductor powders, advantageously with the addition of acid or salts thereof, in an aqueous solution or suspension of a suitable metal compound or a mixture of suitable metal compounds (col. 4, lines 40-46).

See col. 4, line 40 to col. 5, line 66 of Buhler et al.; this disclosure is considered to read upon **claims 8, 12, 19, and 20**.

Patentees' catalyst is useful in a process for the selective production of hydrogen by means of heterogeneous photoredox catalysis by reacting, e.g., mixtures of water and alkali metal sulfites or sulfides under the action of light in a suspension of a cadmium sulfide/semiconductor (col. 2, lines 23-32), said reaction employing light sources such as sunlight, or any desired light having a wavelength, depending on the semiconductor, between approximately 200 and 650 nm. See col. 4, lines 15-27 of Buhler et al. (considered to read upon **claims 21-23**).

Although the reference does not specifically disclose a "shell and a void", the catalyst of Buhler et al. is considered to structurally read upon the claims in their present form.

It is well settled that when a claimed composition appears to be substantially the same as a composition disclosed in the prior art, the burden is properly upon the applicant to prove by way of tangible evidence that the prior art composition does not necessarily possess characteristics attributed to the CLAIMED composition. In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Circ. 1990); In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980); In re Swinehart, 439 F.2d 2109, 169 USPQ 226 (CCPA 1971).



### ***Response to Arguments***

In response to Applicants' arguments traversing the Hirai et al. reference, it is the Examiner's position that the particles obtained from Patentees' process are considered to continue to read upon Applicants' claims in their present form, which define a structure *comprising* a shell and a void—the instant claims do not reflect whether the claimed photocatalyst is in a dispersion, or in an aqueous medium.

Although Hirai et al. disclose the formation of an aqueous dispersion of particles, the reference does not explicitly disclose that the particles themselves are not of a shell-and-void structure, nor does the reference explicitly disclose that the particles are of a shell-and-void structure. Because the reference teaches the formation of metal sulfide particles via employing components comparable to those respectively recited in the instant claims, one of ordinary skill in the art would find reasonable expectation that the particles of Hirai et al. exhibit a shell-and-void structure, absent the showing of convincing evidence to the contrary.

In response to Applicants' argument that the "issue is...whether the reference teaches a capsular structure having a shell containing a cadmium compound and a void or cavity (between the outer and inner surface of the capsular shell)", the Examiner respectfully submits that Applicants' claims do not recite that the claimed void "is between the outer and inner surface" of the shell, or that the void or cavity is adjacent to the capsular shell.

Further, although Hirai et al. do not disclose the specific term "dropping" in describing Patentees' method of treating an aqueous solution of a metal salt with agents

such as sodium sulfide, the prior art's use of terms such as "treating", "contacting", is considered synonymous with "dropping".

The Examiner notes Applicants' reference to the Specification that dropping a cadmium salt into a solution of a sodium compound "will first form a microscopic solid phase of cadmium hydroxide, etc., and then turn into a cadmium compound instantaneously to form the shells of the capsules of the photocatalyst of the present invention"; however, this recitation is also not recited in the instant claims.

It is considered that, from the teachings of Hirai et al. at col. 4, line 66 to col. 5, line 3, one of ordinary skill in the art would select the necessary starting materials (e.g., metal oxide, sulfide-forming agent), to obtain cadmium sulfide.

A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including non-preferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. Denied, 493 U.S. 975 (1989).

In response to Applicants' arguments traversing Buhler et al., it is considered that while the catalyst of Buhler et al. is "useful in a process for the selective production of hydrogen...", the reference is relied upon for its teachings regarding the catalyst, and not its use.

Applicants' arguments that the claimed photocatalyst "is of a stratified structure formed by a particle layer of a cadmium compound" and "has innumerable pores defined by interstices existing among the cadmium particles connected to one another"

Art Unit: 1793

are appreciated; however, these features are also not recited in Applicants' claims in their present form.

Although the “technical concept” of Buhler et al. may differ from the claimed invention, the teachings therein are considered to structurally read upon Applicants' claims.

Where the claimed and prior art compounds possess a close structural relationship and a specific significant property in common which renders the claimed compounds obvious to one skilled in the art, they are effectively placed in the public domain and unpatentable per se, even though the applicant has discovered that they possess an additional activity. In re Mod, et al. (CCPA 1969) 408 F2d 1055, 161 U. S. P. Q. 281.

In response to Applicants' arguments that Buhler et al. do not teach the claimed methods for producing the claimed photocatalyst, the Examiner respectfully submits that the “obvious to try” tactic is not being applied. Rather, Buhler et al. is relied upon for its teachings regarding the deposition of metals—such as platinum—onto semiconductor powders—such as cadmium sulphide—via suspending the powder in an aqueous solution of a suitable metal compound (col. 4, lines 40-46). Further, Applicants' reference to “various mixtures of water and alkali metal sulfites...” appears to be taken from col. 2, lines 23-32 of Buhler et al., which actually states: “...the selective production of hydrogen by means of heterogeneous photoredox catalysis by **reacting**, e.g., mixtures of water and alkali metal sulfites or sulfides **under the action of light in a suspension of a cadmium sulfide/semiconductor...**” (emphasis added by Examiner).

Art Unit: 1793

That is, water is reacted with an alkali metal sulfite (e.g., sodium sulfite) under the action of light in the presence of a suspension of platinum-coated cadmium sulfide/semiconductor. This disclosure is considered to read upon Applicants' "suspending photocatalyst particles...in a solution containing sodium sulfite and applying light thereto."

At col. 4, lines 15-27 of Buhler et al., specific light sources are disclosed—specifically sunlight (line 19) which is both solar and visible.

For these reasons, Applicants' arguments are not persuasive.

### ***Allowable Subject Matter***

10. Claims 9 and 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICIA L. HAILEY whose telephone number is (571)272-1369. The examiner can normally be reached on Mondays-Fridays, from 7:00 a.m. to 3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo, can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 1700 Receptionist, whose telephone number is (571) 272-1700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PATRICIA L. HAILEY/  
Examiner, Art Unit 1793  
February 13, 2008